

We claim:

1. A process for producing homogenous blends of chemical agents and elastomeric fluoropolymers, comprising the steps of:

5 combining, in the presence of a supercritical carbon dioxide, at least one fluoropolymer capable of expansion in the presence of said supercritical carbon dioxide, which includes at least one functional group distributed at one or more locations along its chemical backbone, with at least one chemical agent which includes at least one functional group, which is capable of associating with said at least one functional group distributed at said one or more locations along the chemical backbone of said fluoropolymer, said  
10 combining step permits said at least one chemical agent to impregnate within said at least one fluoropolymer;

permitting said at least one functional group on said chemical agent to associate with said one functional group distributed at said one or more locations along the chemical backbone of said fluoropolymer, said permitting step producing a blend wherein said at least  
15 one fluoropolymer is associated with said at least one chemical agent at at least one of said one or more locations along the chemical backbone of said fluoropolymer; and  
separating said supercritical carbon dioxide from said blend after said permitting step.

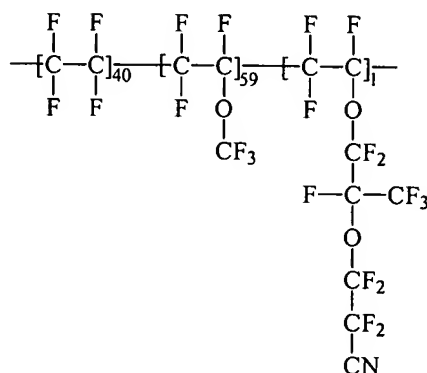
2. The process of claim 1 wherein said at least one chemical agent includes at least two functional groups, each of which can associate with said at least one functional group  
20 distributed at said one or more locations along the chemical backbone of said fluoropolymer so as to either combine two polymer chains of said fluoropolymer or to link two locations of said one or more locations or one polymer chain of said fluoropolymer.

3. The process of claim 2 wherein said two polymer chains of said fluoropolymer are combined by said chemical agent.

25 4. The process of claim 1 wherein said at least one fluoropolymer includes at least two different polymers.

5. The process of claim 1 wherein said at least one chemical agent includes at least two different chemical agents.

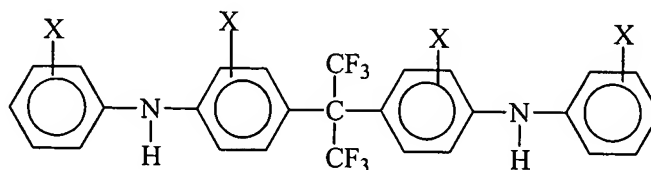
6. The process of claim 1 wherein said at least one polymer is



7. The process of claim 1 wherein said at least one functional group distributed at said one or more locations along the chemical backbone of said at least one fluoropolymer is selected from the group consisting of cyanide groups, hydroxyl groups, amine groups, carbonyl groups, vinyl groups, ethers, esters, and aromatics.

8. The process of claim 1 wherein said at least one functional group on said chemical agent is selected from the group consisting of cyanide groups, hydroxyl groups, amine groups, carbonyl groups, vinyl groups, ethers, esters, and aromatics.

9. The process of claim 1 wherein said at least one chemical agent is



where X can be a hydrogen or a functional group and can be the same or different at different locations.

10. The process of claim 1 wherein said chemical agent is present in said combining step in an amount less than or about equal to an amount needed to titrate all of said one or more functional groups distributed at said one or more locations along the chemical backbone of said fluoropolymer.
- 5 11. The process of claim 1 further comprising the step of agitating said fluoropolymer during said permitting step.
12. The process of claim 11 wherein said step of agitating is performed by ball milling.
13. The process of claim 11 wherein said step of agitating is performed using a brabender apparatus.
- 10 14. The process of claim 11 wherein at least one of said combining and said permitting steps are performed at temperature and pressure conditions which, absent said supercritical carbon dioxide and agitation occurring said agitating step, are not sufficient to induce significant chemical reaction among said at least one polymer and said at least one chemical reagent.
- 15 15. The process of claim 11 wherein at least one of said combining and permitting steps are performed at a pressure of less than about 10,000 psi.
16. The process of claim 1 wherein said removing step is achieved during a spraying operation.
17. The process of claim 1 wherein said removing step is achieved by abrupt pressure reduction.
- 20 18. The process of claim 1 wherein said at least one chemical agent is a crosslinking additive.
19. The process of claim 1 wherein said at least one chemical agent is selected from the

group consisting of crosslinking agents, dyes, pigments, fillers, and tougheners.

20. The process of claim 1 further comprising the step of solubilizing said at least one chemical agent in a solvent that dissolves in said supercritical carbon dioxide prior to said step of combining.

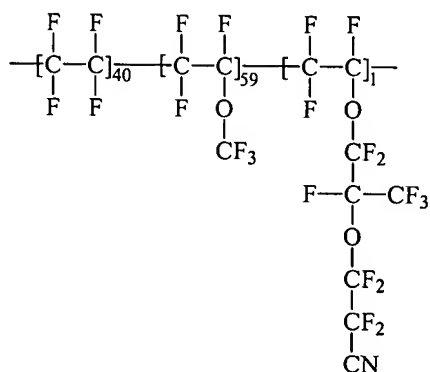
5 21. The process of claim 20 wherein said step of solubilizing is performed prior to said step of combining.

22. The process of claim 20 wherein said at least one chemical agent is solubilized in said solvent to approximately to saturation.

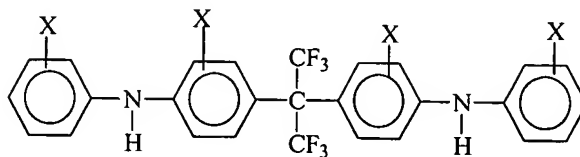
10 23. The process of claim 20 wherein said solvent does not solubilize said at least one fluoropolymer to a significant degree.

24. A process for producing a homogenous blend of a fluoroelastomer and a crosslinking agent comprising the steps of:

combining

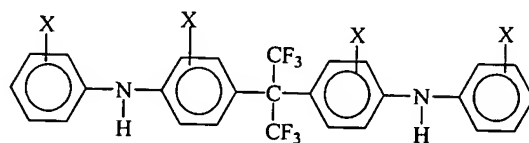


and



where X can be a hydrogen or an amine moiety and can be the same or different at different locations, and wherein at least to locations are an amine moiety, and wherein the combining step is performed in the presence of supercritical carbon dioxide wherein the

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is pre-dissolved in acetone during said combining step;

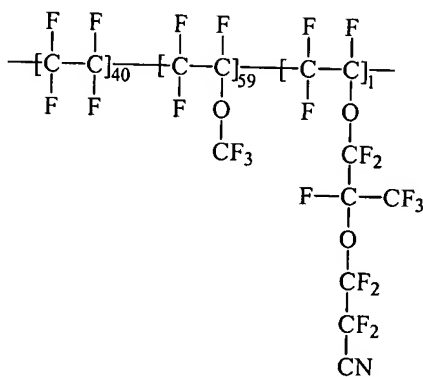
allowing functional groups on the chemicals combined in said combining step to associate and form a blend; and

separating said supercritical carbon dioxide from said blend.

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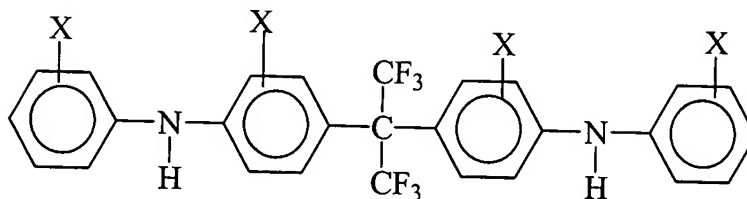
25. A homogenous blend of a fluoroelastomer and a crosslinking agent, formed by the steps of:

combining



and

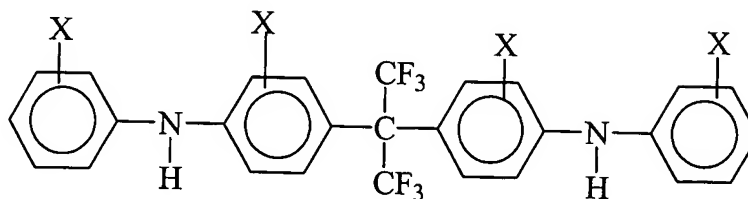
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where X can be a hydrogen or an amine moiety and can be the same or different at different

locations, and wherein at least to locations are an amine moiety, and wherein the combining step is performed in the presence of supercritical carbon dioxide wherein the

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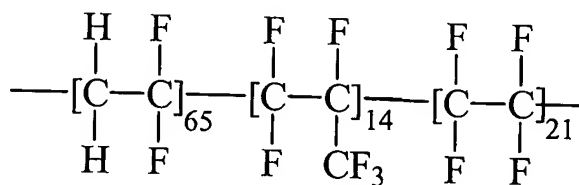
allowing functional groups on the chemicals combined in said combining step to associate and form a blend; and

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separating said supercritical carbon dioxide from said blend.

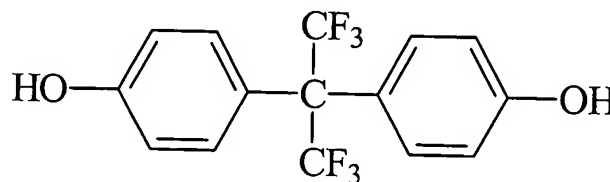
26. A process for producing a homogenous blend of a fluoroelastomer and a crosslinking agent comprising the steps of:

combining

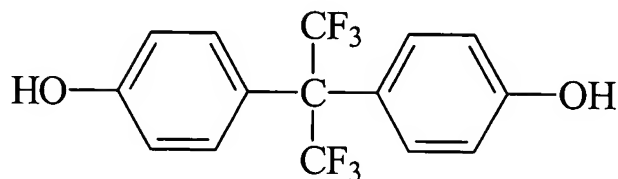


and

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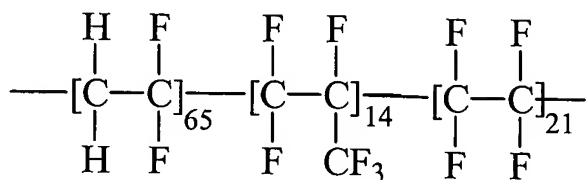


wherein the combining step is performed in the presence of supercritical carbon dioxide  
 wherein the



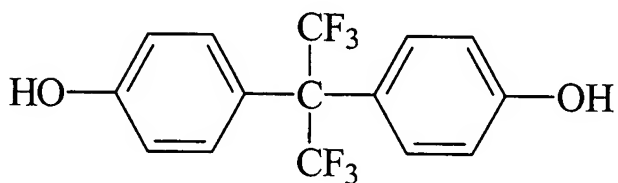
- 5 is pre-dissolved in acetone during said combining step;  
 allowing functional groups on the chemicals combined in said combining step to  
 associate and form a blend; and  
 separating said supercritical carbon dioxide from said blend.

27. A homogenous blend of a fluoroelastomer and a crosslinking agent, formed by the steps  
 10 of:  
 combining

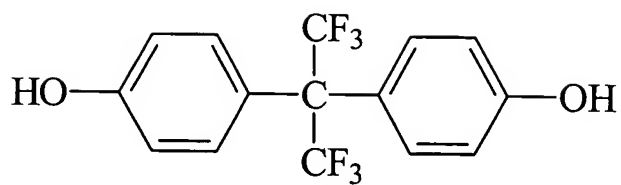


and

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wherein the combining step is performed in the presence of supercritical carbon dioxide  
 wherein the



is pre-dissolved in acetone during said combining step;

allowing functional groups on the chemicals combined in said combining step to

5 associate and form a blend; and

separating said supercritical carbon dioxide from said blend.